VERIFICATION OF A TRANSLATION

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I, the translator Carina Cremer, hereby declare:

My name and post office address are as stated below.

I am knowledgeable in the English language and in the language in which the above identified application was filed, and that I believe the English translation of the above application as filed is a true and complete translation.

All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Additional Drive System by Diverting the Fluid Flow

The invention relates to a new use of a drive system working on the basis of the Magnus effect for the purpose of an additional drive for an existing propulsion system.

Additional wind drive systems are known which are based on the Magnus effect (Magnus, 1852), which make use of further physical bases (Prantl, 1904) for this and were implemented for the first time in the development of the Flettner rotor (Flettner, 1922), cf. also GB-A 2 102 755 (Blohm & Voss) with a "Flettner rotor" for ship propulsions.

The Flettner rotor was put into practice on the basis of tests of AVA, Göttingen (1922-1924) by Germania-Werft with the rebuilding of the "Buckau" sailing ship (1924) and the RMS "Barbara" (1926).

With these additional wind drive systems wind and relative wind flows directly against a driven rotating circular cylinder (rotor); quite a considerable propulsion is generated by the Magnus effect.

A disadvantage of these additional drive systems is that they can only generate a propulsion in the case of specific directions of the wind (up to 2 points in the direction of motion).

For this reason, these known additional drive systems cannot be used for vehicles which are moving relatively quickly, since, due to the strong relative wind, the entire wind flow takes place substantially from the front and is thus outside the range of action.

The object of the invention is an additional drive system which can generate a propulsion even in the case of a fluid flow that impacts directly from the front.

Here, the fluid may consist both of air, gases or liquids. Although the examples are directed to an air flow, the invention nevertheless comprises all types of fluid flows (claims 1, 2, 17, 20).

The idea covered by the invention is the diverting of fluid generated by the travel speed that impinges on a rotating cylinder from the front to generate a propulsion on the basis of the Magnus effect. For this purpose, the additional drive system is connected with a vehicle which itself and independently has a further drive which can be called the main drive. The additional drive system which utilizes the fluid flow caused by the motion is used in addition to this main drive (in the direction of a forwardly directed driving power). It is in particular advantageous to additionally drive such vehicles and to thus reduce driving energy in the sense of fuels, which have a normal speed range between 50 km/h and 100 km/h, in particular in the range of more or less 80 km/h. Land craft such as trucks or automobiles which are mentioned here with preference, but not exclusively, are moved relatively quickly (measured above the ground) and, nevertheless, they can utilize the additional effects of the rotating cylinder at speeds which are far below of those of aircraft, against which fluid generated by the travel speed flows, namely after a diverting. The supplementary propulsion is caused by the Magnus effect in such a way that the craft is additionally driven in the propulsion direction saving a noticeable amount of its own fuel or resources that are required by the main drive.

The use covers the influence of the fluid entering the channel from the front with its diverting so that it is passed onto the Magnus rotor which is vertically or horizontally disposed (claim 1, claim 2).

Special designs of the shape of the channel (claims 10 to 12) and the orientation of the diversion (claims 3 to 7) enable adaptations to the use, e.g. in the case of land craft (claim 13) which are vehicles that are moved relatively quickly and in which the relative wind (as a fluid) flows substantially from the front. The relative wind itself is (primarily) generated by the regular drive (propulsion) of the vehicle and enables thus the utilization of this flowing fluid with and by the additional drive system that is provided with the diversion. A displacement of the rotating cylinder from the center of the channel (claim 8, claim 9) enables an increase in this effect.

Claims 14 to 16 cover the vehicles that are moved relatively quickly and move above the respective ground, i.e. have a speed of more than about 10 km/h in the case of ships and naval craft, and clearly more than this speed, more than substantially 50 km/h to 100 km/h in the case of land craft, but clearly less than the speed of aircraft, the speed of which is too high since in these speed ranges the effectiveness of the additional drive system by the Magnus effect is no longer advantageously created as in the speed ranges indicated above.

It is understood that the use inherently also covers a process as a driving process (claim 18) and that, since an additional drive system is covered, the device as such includes its inherent function as the use in additional to an existing drive system (claims 21, 22).

GB-A 371,691 (Medvedeff) describes an airship with an angularly designed channel in which three Magnus rotors are inserted, which are electrically driven. These rotors are located horizontally to the plane of the main ship and together are of a U-shape, only the central rotor providing for the propulsion in the longitudinal direction of the airship. Several turbines suck in air through laterally existing openings to a channel, which is supplied to the rotors for the generation of a propulsion force from the one rotor and for generating a lifting power as regards the two other rotors. An additional drive system is not described here. GB-A 2 256 410 (MacDuff) shows a watercraft according to Figs. 4 to 6 thereof, which can also be used in a floating platform according to Fig. 11 thereof or a submarine according to Fig. 12 thereof, a water flow in a water channel being utilized, which is generated by a pump in the channel. This drive system provides for the propulsion of the "naval craft" (as a summary term for the mentioned individual objects), but it is not designed in addition to another existing system, but is the only main drive system for the propulsion of the naval craft. In GB-A 494,093 (Gavrilov) individual rotors working in accordance with the Magnus principle are shown in Fig. 12 thereof, which are described as "finger-like" elements. These finger-like elements can be disposed on a plurality of points of a ship or a submarine, cf. in this connection Figs. 4 to 12 thereof, said points being not explained in detail here, but are used in addition to a presumably existing main drive system of the ship. However, no fluid flow in a channel is utilized in the arrangement of these finger-like elements, but the fluid flow laterally flowing past the ship, which, however, is not diverted.

Examples explain and supplement the invention.

Fig. 1 shows a possible design, in which the relative wind F enters a channel 10 and is upwardly diverted.

Fig. 2 is a front view of the air inlet of the channel 10 in two variants as Figs. 2a, 2b.

Fig. 3, Fig. 3a is a variant with changed diversion.

Fig. 4, Fig. 4a is a further variant with a changed position of the rotating cylinder.

Fig. 5 is a variant with a baffle plate in front of the diversion section.

Fig. 6 is a variant with a diversion of the fluid generated by the travel speed towards below.

A first variant is shown in Fig. 1. In this variant, the relative wind F enters the channel 10 and is upwardly diverted before it impinges on the horizontally disposed, rotating cylinder 20. The first force 30 and the second force 40 result which act on the channel 10. The drive or transverse drive 50 that is generated by the rotating cylinder is, however, several times higher, and the "resultant force" 60 results as a propulsion. This force is transmitted to the vehicle Z (not shown) (in Fig. 2 outlined below the channel 10). Here, the main propulsion system, e.g. an engine, that is not represented in greater detail, is disposed, which drives wheels through a transmission.

The relative wind entering the channel 10 is drawn entering an inlet opening 10' as indicated in Fig.1, it is then guided along a section of the channel and upwardly diverted by a diversion point 10", in order to be guided to the rotating cylinder 20 which is disposed in a higher section. The rotational speed and/or direction ω of the cylinder is drawn so that the corresponding air flow on one side of the cylinder is added to the speed and is subtracted from it on the other side of the cylinder. The drive or transverse drive 50

and the force 30 that is vertical to it results from this. The resultant force 60 is transmitted to the channel 10 and from there to the craft which is represented in two variants in Fig. 2, on the one hand, with a completely open air inlet 10 as in Fig. 1 and, on the other hand, with several channels 10*, which are adjacent in order to guide the direction of flow of the fluid F, to divert it and to then guide it onto the rotating cylinder 20 which is driven by an engine M (not shown) and held by bearings 18, 19, which are shown in greater detail in Fig. 2.

The representation that two different types of the guiding of the flow are represented in one picture one above the other is not to obscure the fact that the left-hand and right-hand sides of Fig. 2, i.e. Fig. 2a and Fig. 2b, are in each case intended with reference to an entire vehicle Z and/or an entire vehicle width.

As shown in Fig. 2 the rotating cylinder 20 is disposed transversely to the direction of travel in this variant and, in a further variant, it is preferably provided with end plates 70 in order to further increase the effect of the Magnus effect. This Fig. shows a front view of two types of the air entry and/or the channel guiding 10' or 10+ with divided air inlets F'.

The guiding of the fluid is positively covered with a channel which guides the fluid, but on the other hand, is also described as such with "air inlet", "passing on of air" and "diversion". This is to be complementarily understood, on the one hand, the guided fluid, and, on the other hand, the object guiding it. The latter is coupled to the vehicle at a connection surface 10a.

The speed of the cylinder 20, that is driven by the engine, is preferably in the order of between twice to four times the air speed in the channel 10 which can also be coordinated with the regular locomotion speed of the respective vehicle and also be changed by means of a control means. The main speed is meant by regular driving speed which a vehicle has, e.g. trucks which are preferably operated in a range of more or less 80 km/h in the forward direction in the long run or automobiles which, if there is a speed restricted, are operated at a speed of 50 km/h to 100 km/h. In the case of craft on the water the speed is reduced, always in relation to the medium on which the craft is moved "relatively quickly", here, at more than 10 km/h.

In further variants, the diversion 10" of the air flow F that impacts from the front (and enters the channel 10) can be implemented by an angle deviating from 90° as shown in Figs. 3, 3a; due to this, a changed direction of the resultant force 60' is achieved.

As is shown in Figs. 4, 4a, the transverse drive 50 generated by the rotating cylinder 20 can be increased in a further variant by the fact that this cylinder is not disposed in the center of the fluid channel 10, but asymmetrically to it. The differences in the masses b, c show this, the diameter d of the rotating cylinder 20 being the same.

Due to this asymmetric arrangement, the speed of the air on the side of the cylinder which is in the direction of travel is additionally accelerated and the generated vacuum is increased to bring about the transverse drive 50.

As is represented in Fig. 5, the fluid channel may be covered by a baffle plate 80 in front of its diversion 10" in order to reduce the aerodynamic drag of the fluid generated by the travel speed.

The diverting of the relative wind (as an example of the fluid) can both be implemented upwards and downwards. The direction of the resultant force 60 is shifted by this as is shown in Fig. 6. However, a propulsion is generated in both variants.

A further variant (not shown) comprises one or several rotating cylinders 20 that are vertically disposed (as in the Flettner rotor). A diversion of the air flow in the fluid channel 10 takes place towards the side in order to generate the desired propulsion.

The channel 10 may be designed in a rectangular fashion as shown in Figs. 1, 2 (variant 1). Alternatively, the channel 10 may be divided; here, these (several) channels 10* may in each case be of a rectangular, elliptical or circular design. as is shown in Fig. 2b.

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